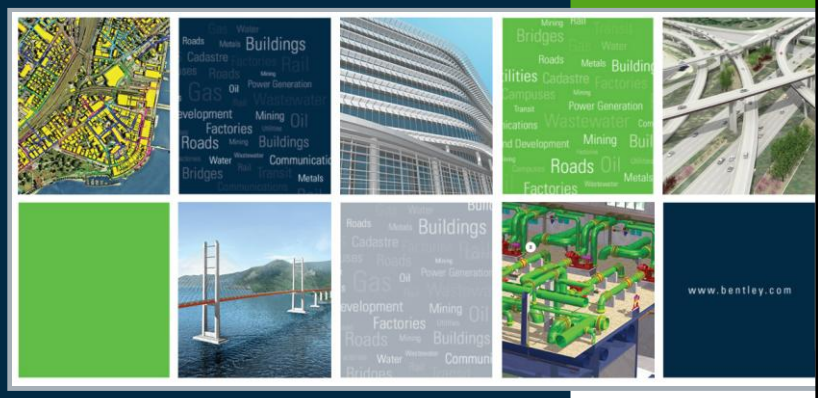


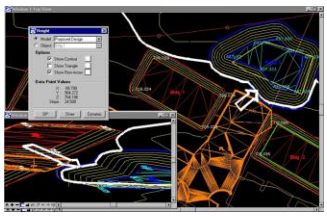
Civil Integrated Management 3D Tools

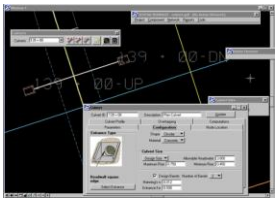
Derricke Gray
Product Manager, Bentley Civil Americas

Bentley
Sustaining Infrastructure

A Look Back

Over the years, civil software has continually progressed with technologies that give the engineer the ability to process, design and analyze information.





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A Look Back

However, even as technologies advanced, the workflows and deliverables continued to target one thing.

Plans Production.

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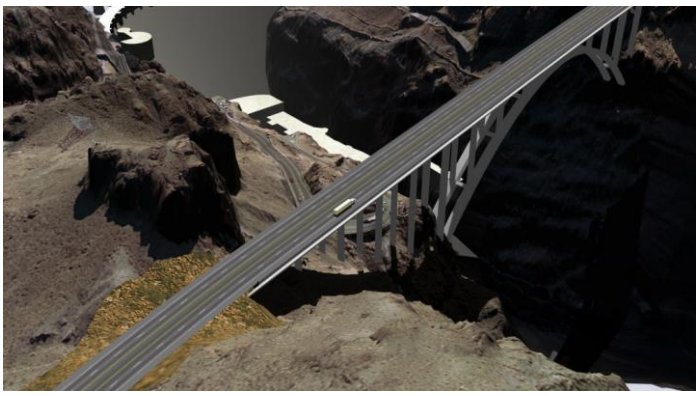
3D Models

3D models were something we produced for public meetings, to show how nice our road or bridge was going to look after it was built. They were a 'by-product' of design – not it's focus.



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However, as time passed and technologies and applications became more advanced and efficient, there was a problem in the industry that was becoming apparent.

"**Specialists in the various disciplines have been able to optimize their own in-house operations … most failures are caused by *poor handoffs between disciplines*.**"

Tommelein and Gil (1999)

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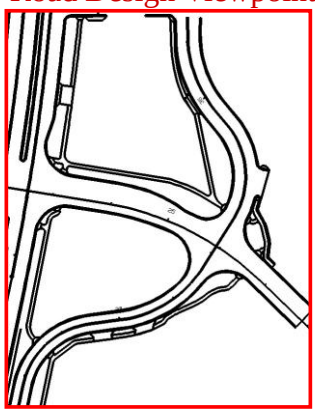
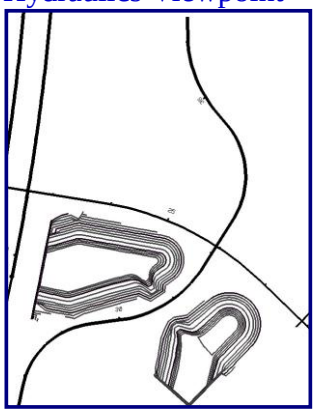
Pond/Road Example

Road Design Viewpoint



Hydraulics Viewpoint



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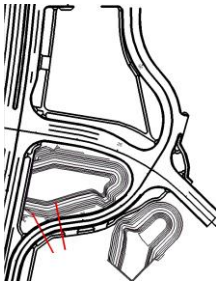
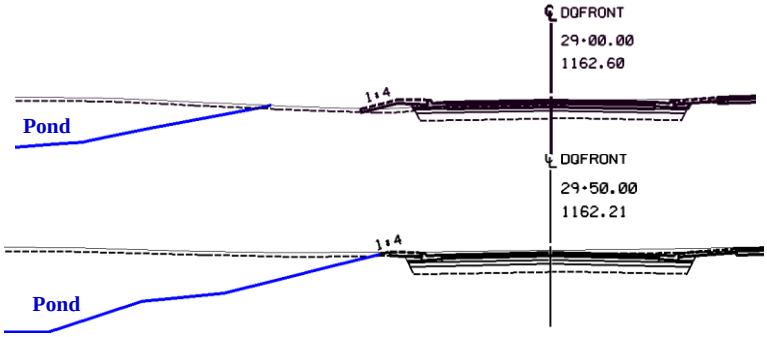
Pond/Road Example

- Road designer did his/her job in that ponds were depicted on cross sections:





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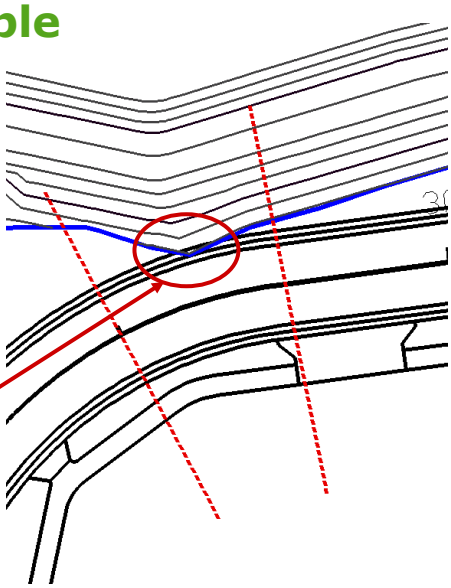
Pond/Road Example

As [bad] luck would have it, cross sections at 29+00 and 29+50 missed intrusion of pond edge over curb & gutter.



A view that the Road Designer never saw.

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Incomplete Information Flow

Incomplete Information Flow

Machine Control

However, *Machine Control* technology (circa 2002) forced us to re-think our approach in order to supply contractors with models in lieu of traditional stake-out workflows. In effect, the move was on to a 'model centric' design process – in effect changing the paradigm so that models became the focus of design.

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3D Tools

- What 3D Tools Can Do (*Designer*)

- What 3D Tools Can Provide (*Contractor*)

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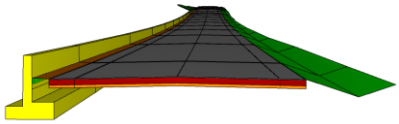
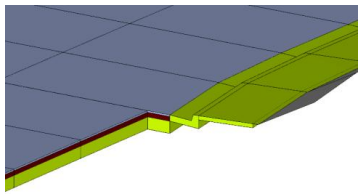
What 3D Tools Can Do

- Build very precise models
  - **Using Intelligent Template Technology**
  - Placed at Precise Locations





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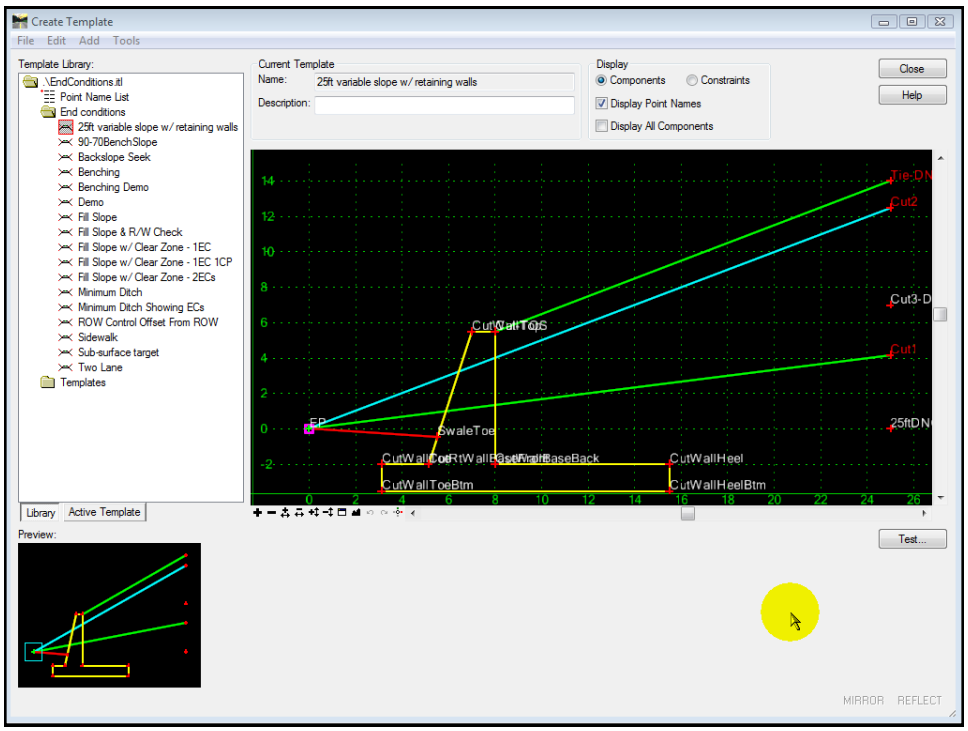

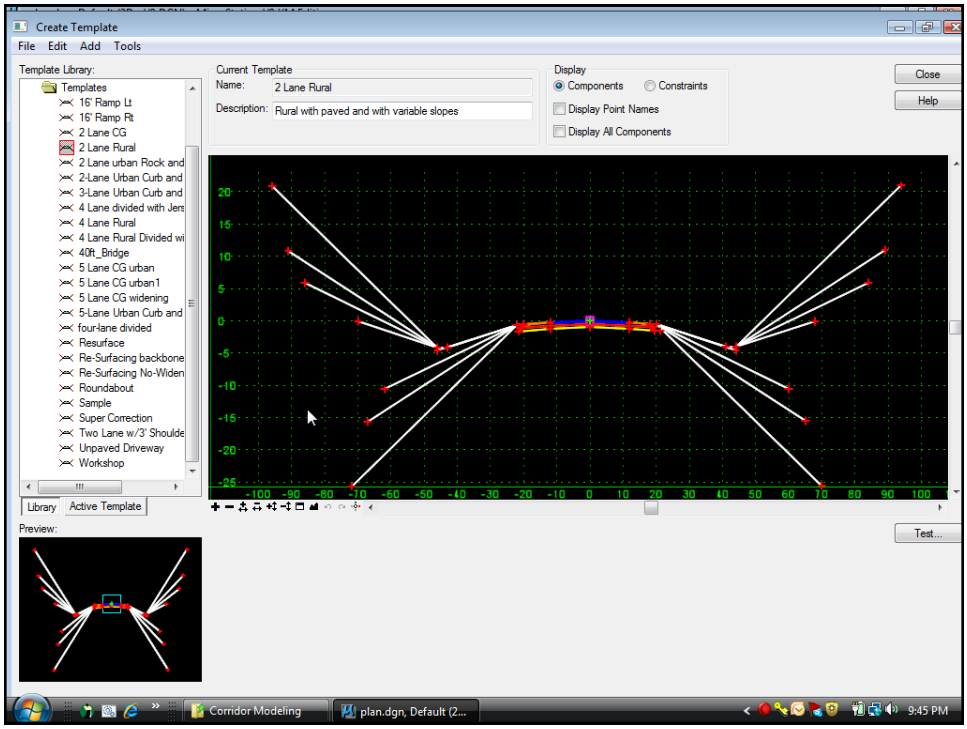
Create Template
File Edit Add Tools
Template Library:
Templates
16' Ramp Lt
16' Ramp Rt
2 Lane CG
2 Lane Rural
2 Lane urban Rock and
2-Lane Urban Curb and
3-Lane Urban Curb and
4 Lane divided with Jers
4 Lane Rural
4 Lane Rural Divided wi
40ft_Bridge
5 Lane CG urban
5 Lane CG urban1
5 Lane CG widening
5-Lane Urban Curb and
four-lane divided
Resurface
Re-Surfacing backbone
Re-Surfacing No-Widen
Roundabout
Sample
Super Correction
Two Lane w/3' Shoulde
Unpaved Driveway
Workshop
Library
Active Template
Preview:
Current Template
Name: 2 Lane Rural
Description: Rural with paved and with variable slopes
Display
Components
Constraints
Display Point Names
Display All Components
Close
Help
Test...
Corridor Modeling
plan.dgn, Default (2...
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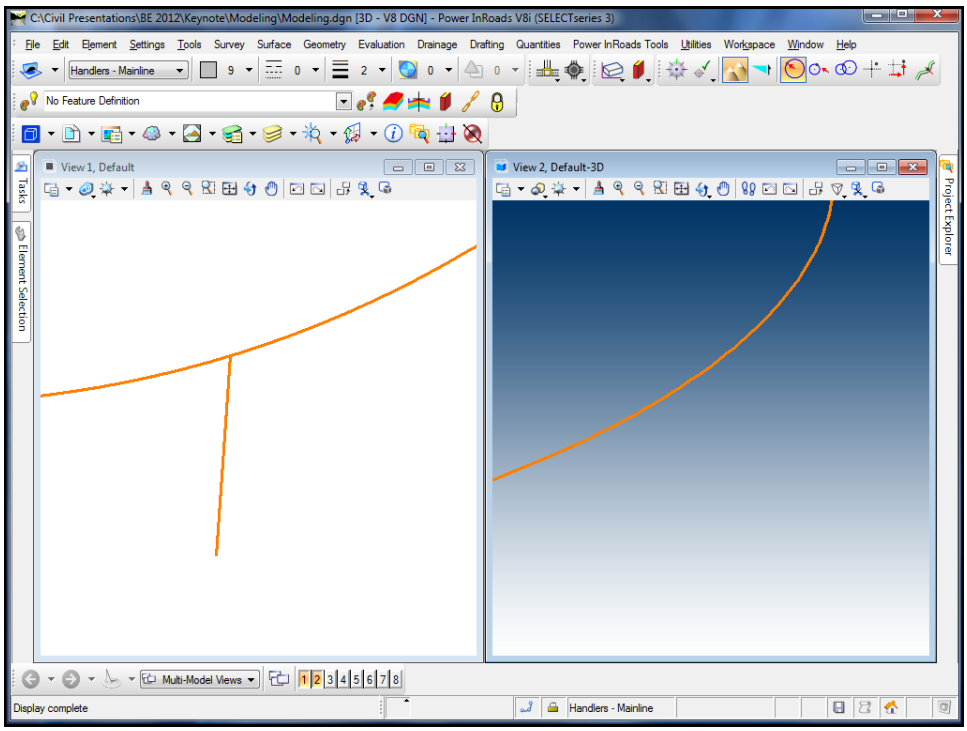
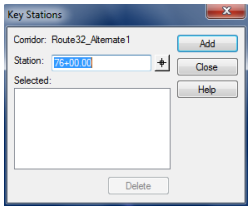
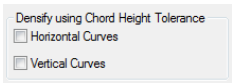
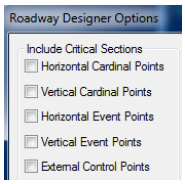

C:\Civil Presentations\BE 2012\Keynote\Modeling\Modeling.dgn [3D - V8 DGN] - Power InRoads V8i (SELECTseries 3)
File Edit Element Settings Tools Survey Surface Geometry Evaluation Drainage Drafting Quantities Power InRoads Tools Utilities Workspace Window Help
Handlers - Mainline
No Feature Definition
View 1, Default
View 2, Default-3D
Tasks
Element Selection
Project Explorer
Multi-Model Views
Display complete
Handlers - Mainline

What 3D Tools Can Do

- Build very precise models
  - Using Intelligent Template Technology
  - **Placed at Precise Locations**
    - Standard Templates Drops (Every 5', 10', etc.)
    - All Cardinal Points (PC, PT, VPC, VPI, etc.)
    - All Event Points (Superelevation Changes, etc.)
    - All Control Points (Begin and Ends of Walls, etc.)
    - Key Stations (Culvert Crossings, etc.)
    - Chording through Horizontal and Vertical Curves

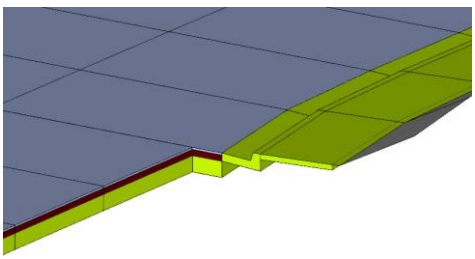


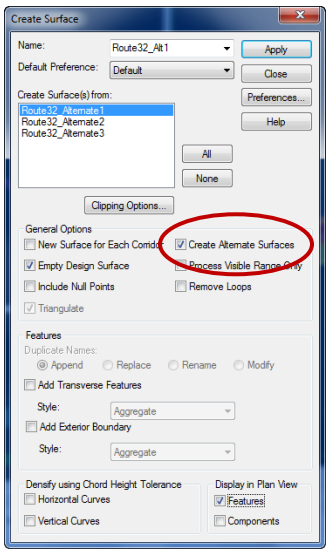




What 3D Tools Can Provide

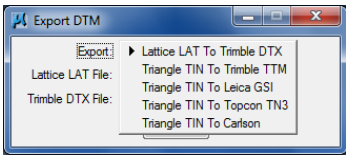
- Any Surface
- Alternate Surfaces
  - Top of Pavement
  - Grading
  - Bottom of Asphalt
  - Bottom of Aggregate Base
  - Etc.



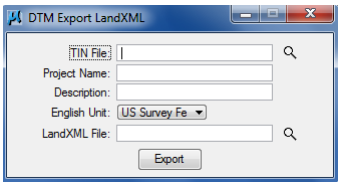


What 3D Tools Can Provide

- Export Surfaces to Native Formats



- Export Surfaces via LandXML



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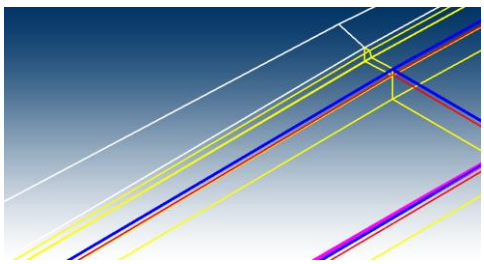
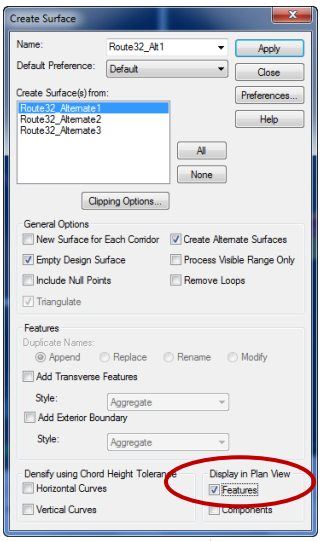
What 3D Tools Can Provide

- Graphical Data
  - *3D Breaklines*
  - *3D Triangles*
  - *DGN or DWG Format*





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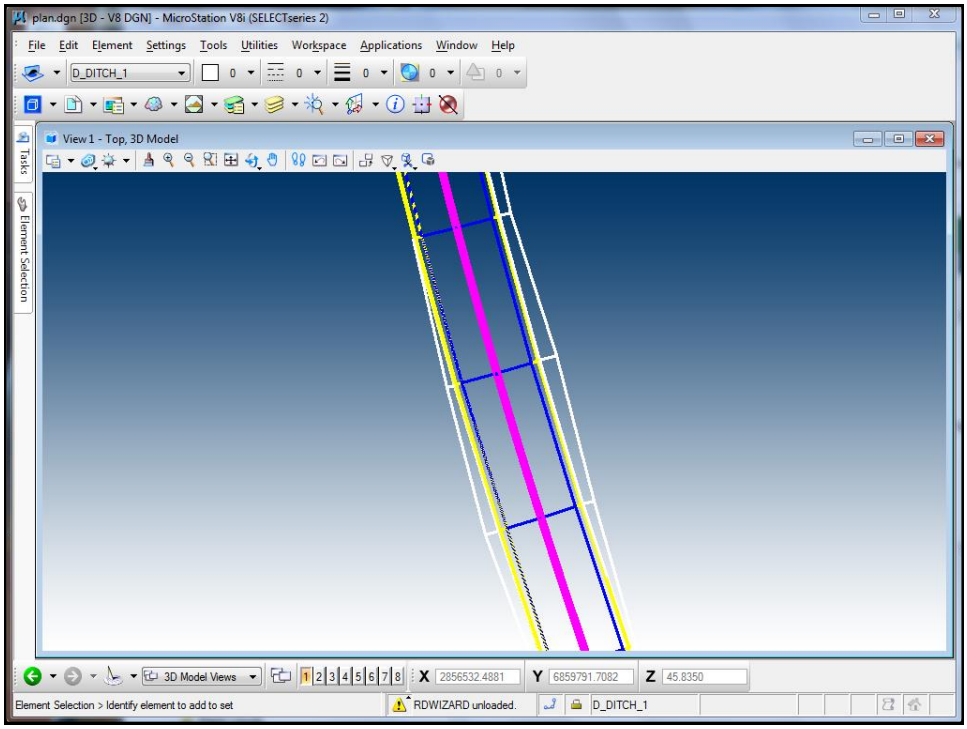
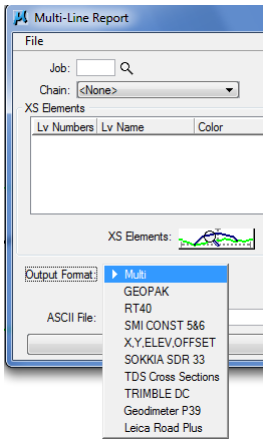
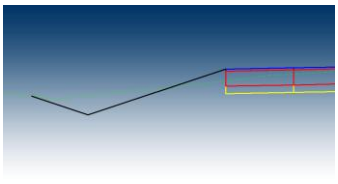


Cross Sections

- Cross Sections
  - RT 40
  - SMI
  - SOKKIA
  - TDS
  - Trimble
  - Geodimeter
  - Leica
  - Etc.





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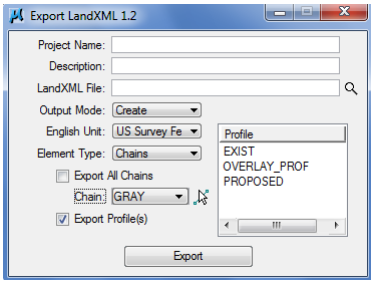
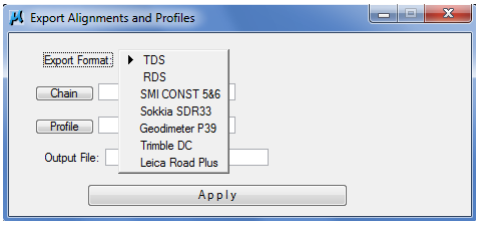
Geometry

- LandXML
- Vendors
  - TDS
  - RDS
  - SMI
  - Sokkia
  - Geodimeter
  - Trimble DC
  - Leica Road Plus
  - SDMS





Bentley

Thank You!

Derricke Gray
Product Manager, Bentley Civil Americas

Bentley
Sustaining Infrastructure